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**Science Applications International
Corporation
Bell South Fleet Manager**

**Spurious Emissions Measurements
IAW CFR 47, Parts 2, 15 & 90**

**Date of Test
02 October 2002**

Conducted For: Science Applications International Corporation
10260 Campus Point Drive
San Diego, CA 92121

Conducted By: Aegis Labs, Inc.
22431-B160 Antonio Parkway #417
Rancho Santa Margarita, CA 92688

AEGIS LABS, INC.

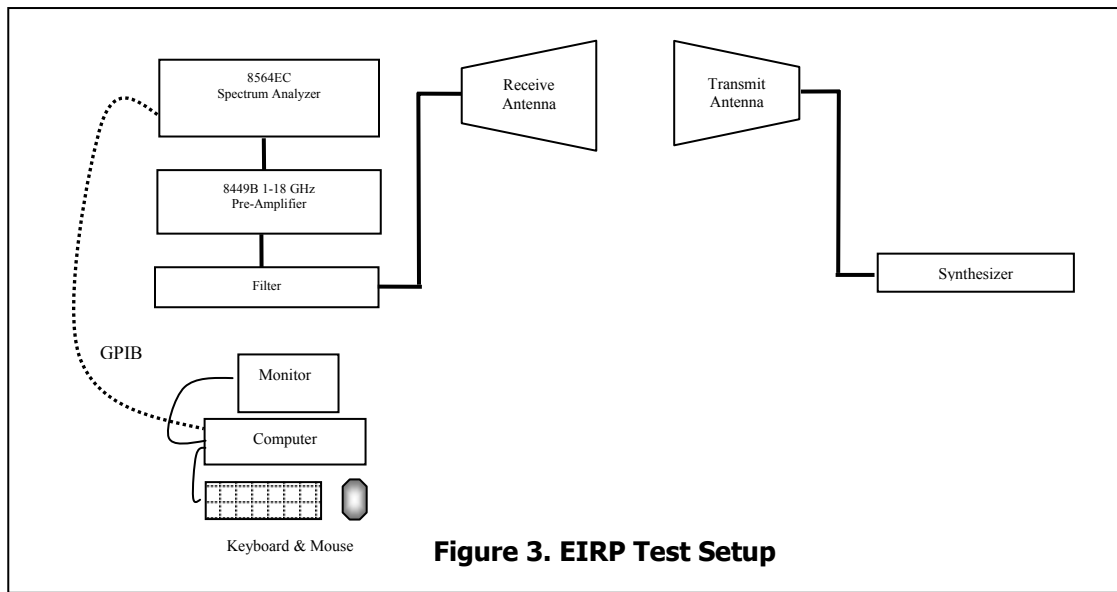
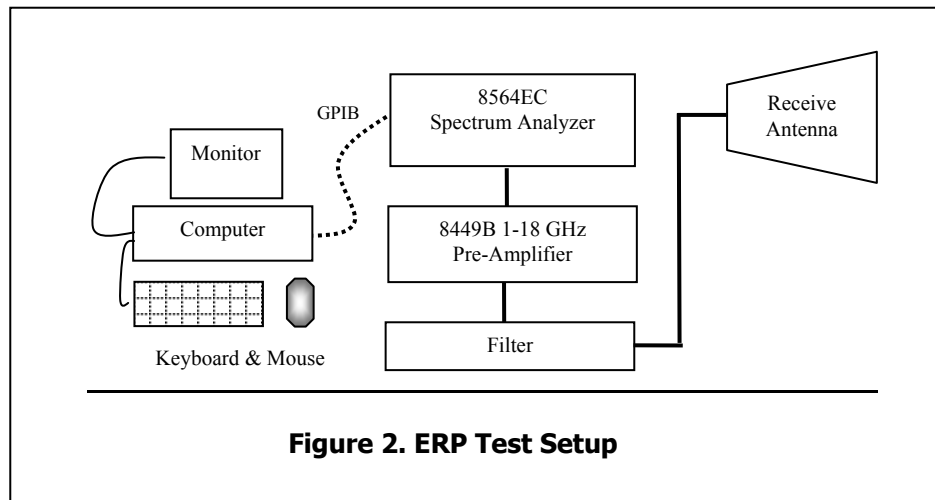
22431-B160 Antonio Parkway, #417, Rancho Santa Margarita, CA 92688

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2.2 Test Detection System

The test data collection system for ERP measurements was comprised of a spectrum analyzer, a preamplifier and a high pass filter – when required (see Figure 2). This same system was also used in the EIRP / signal substitution measurements; additionally, a synthesizer and radiating horn were required to complete EIRP measurements (see Figure 3).

The RIM ICU emissions testing was accomplished on a certified 3/10 m Open Area Test Site at Aegis Labs, Inc. A 1 to 4 meter mast and a turntable were used on the OATS to maximize the signals selected for measurement. All test equipment are in current calibration (see Table 2).



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Equipment Name	Manufacturer	Model Number	Serial Number	Cal. Due Date	Cal Cycle
Site #2 NSA	Aegis Labs, Inc.	N/A	N/A	10/24/02	1 Year
Spectrum Analyzer	Agilent	8564EC	4046A00387	02/28/04	2 Years
Preamplifier	Agilent	8449B	3008A01573	04/29/03	1 Year
Antenna-Bicon	EMCO	9018-1421	3110	10/12/02	1 Year
Antenna – Log Periodic	EMCO	3148	1947	10/12/02	1 Year
Antenna - Horn	EMCO	3115	2230	09/14/03	1 Year
Temperature/Humidity Monitor	Dickson	TH550	7255185	01/08/03	1 Year

Table 2. Test Equipment Calibration

2.3 Derivation of Limit Line

The limit cited in the tables is the level at which the measured spurious emission is -31dBc from the transmitter fundamental. The limit line calculation is given in Table 3.

RIM				
Freq. (MHz)	Meter (dBUV)	Corrected (dBUV/m)	ERP dBm	Limit at 31dBc
897.96	81.20	110.44	3.44	-27.56

Table 3. Limit Line Calculation

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3.0 ERP Test Data

The ERP test data collection for RIM ICU was accomplished on the OATS at a distance of 10m from the perimeter of the EUT. The equipment was operated in a typical mode; GPS satellite locked and tracking and data transmitting.

3.1 RIM ERP Test Data

The RIM data reported below were the highest readings received in each receive antenna polarization. The ERP data were collected, corrected for the cable loss or amplification factor and are presented as corrected data in Table 4.

RIM Harmonic ERP Measurements Horizontal Open Field Maximized Data							
Freq. (MHz)	Meter (dBuV)	Ant Ht. (cm)	Azimuth (degrees)	Corrected (dBuV/m)	ERP (dBm)	Limits dBm	Diff (dB) +=FAIL
1795.5	75.5	100	0	69.66	-37.34	-27.56	-9.77
2693.37	56.67	100	0	53.55	-53.45	-27.56	-25.89
3591.04	52.33	100	0	52.41	-54.59	-27.56	-27.02
4488.74	42.67	100	0	44.54	-62.46	-27.56	-34.90
5386.12	42.5	100	0	46.12	-60.88	-27.56	-33.32
6284.38	44.67	100	0	48.77	-58.23	-27.56	-30.67
No signals found for the remaining harmonics							
RIM Harmonic ERP Measurements Vertical Open Field Maximized Data							
Freq. (MHz)	Meter (dBuV)	Ant Ht. (cm)	Azimuth (degrees)	Corrected (dBuV/m)	ERP (dBm)	Limits dBm	Diff (dB) +=FAIL
1795.48	85.17	100	0	79.33	-27.67	-27.56	-0.10
2693.25	66.17	100	0	63.05	-43.95	-27.56	-16.39
3591.01	59	100	0	59.08	-47.92	-27.56	-20.36
4488.78	45.5	100	0	47.37	-59.63	-27.56	-32.07
5386.88	43.32	100	0	46.94	-60.06	-27.56	-32.50
6284.27	44.17	100	0	48.27	-58.73	-27.56	-31.17
No signals found for the remaining harmonics							
Table 4. RIM Spurious Emissions - ERP							

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4.0 EIRP Test Data

The EIRP data were derived using a signal substitution method presented in TIA/EIA 603-1992, paragraph 2.2.12. The frequency under evaluation was radiated from the RIM ICU, a synthesizer and radiating horn were placed at the EUT location on the OATS and a signal was radiated which matched the amplitude of the EUT spurious emission. That synthesizer RF level, adjusted for the transmit antenna cable loss and substitute-antenna gain figure, is presented as corrected EIRP data. Again, the limit cited in the tables is the level at which the measured spurious emission is -31dBc from the transmitter fundamental.

4.1 RIM EIRP Test Data

The RIM data reported below were the highest readings received in each receive antenna polarization. The EIRP data were collected, corrected for the cable loss and antenna gain figure and are presented as corrected data in Table 6.

RIM Harmonic EIRP Measurements

Horizontal Measurement using Signal Substitution TIA/EIA 603

Frequency	Spec. An.	Sig. Gen.	Antenna Gain	EIRP	Limit	Differ
(MHz)	(dBuV)	(dBm)	(Db)	(dBm)	(dBm)	+=FAIL
1795.5	75.5	-37.7	4.6	-33.1	-27.56	-5.54
2693.37	56.67	-56.3	6.9	-49.4	-27.56	-21.84
3591.04	52.33	-58.2	9.2	-49	-27.56	-21.44
4488.74	42.67	-67.8	8.7	-59.1	-27.56	-31.54
5386.12	42.5	-69.6	8.4	-61.2	-27.56	-33.64
6284.38	44.67	-65.8	8.8	-57	-27.56	-29.44

RIM Harmonic EIRP Measurements

Vertical Measurement using Signal Substitution TIA/EIA 603

Frequency	Spec. An.	Sig. Gen.	Antenna Gain	EIRP	Limit	Differ
(MHz)	(dBuV)	(dBm)	(Db)	(dBm)	(dBm)	+=FAIL
1795.48	78.17	-34.8	4.6	-30.2	-27.56	-2.64
2693.25	66.17	-44.7	6.9	-37.8	-27.56	-10.24
3591.01	59	-51.1	9.2	-41.9	-27.56	-14.34
4488.78	45.5	-63	8.7	-54.3	-27.56	-26.74
5386.88	43.32	-65.1	8.4	-56.7	-27.56	-29.14
6284.27	44.17	-63.5	8.8	-54.7	-27.56	-27.14

Table 6. RIM Spurious Emissions - EIRP

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5.0 Radiated Emissions Test Data

The radiated emissions were measured on the OATS from 30MHz to 1000MHz and compared to the CFR 47, Part 15, Class A limits. The test data collection for RIM ICU was accomplished at a distance of 10m from the perimeter of the EUT. The equipment was operated in a typical mode; satellite locked and tracking and data transmitting.

5.1 RIM Radiated Emissions Test Data

The RIM data reported below were the highest readings received in each receive antenna polarization. The data were collected, corrected for the cable loss or amplification factor and are presented as corrected data in Table 8.

RIM Radiated Emissions 30M-1000MHz

Horizontal Open Field Maximized Data

Freq.	Meter	Ant Hgt	Azimuth	QP or AV		Corrected	Limits	Delta Limit
(MHz)	(dBuV)	(cm)	(degrees)	(dBuV)		(dBuV/m)	(dBuV/m)	(dB)
34.11	43.60	350.00	180.00			27.74	39.00	-11.26
65.18	44.00	400.00	0.00			18.62	39.00	-20.38
128.90	48.60	400.00	135.00			30.38	43.50	-13.12
199.90	47.30	400.00	270.00			32.29	43.50	-11.21
288.06	35.70	400.00	270.00			23.96	46.50	-22.54
298.58	44.50	400.00	45.00			33.37	46.50	-13.13
331.79	47.10	250.00	225.00			31.09	46.50	-15.41
344.09	39.20	300.00	225.00			23.27	46.50	-23.23
347.67	39.50	300.00	270.00			23.59	46.50	-22.91
400.34	44.40	200.00	270.00			29.78	46.50	-16.72

RIM Radiated Emissions 30M-1000MHz

Vertical Open Field Maximized Data

Freq.	Meter	Ant Hgt	Azimuth	QP or AV		Corrected	Limits	Delta Limit
(MHz)	(dBuV)	(cm)	(degrees)	(dBuV)		(dBuV/m)	(dBuV/m)	(dB)
34.65	46.40	100.00	0.00			30.35	39.00	-8.65
65.18	54.30	100.00	315.00			28.92	39.00	-10.08
127.81	54.00	100.00	135.00	53.59	Q	35.26	43.50	-8.24
200.08	43.70	100.00	270.00			28.69	43.50	-14.81
288.04	33.40	100.00	0.00			21.66	46.50	-24.84
299.72	47.90	100.00	270.00	46.45	Q	35.39	46.50	-11.11
306.62	38.50	100.00	90.00			21.64	46.50	-24.86
320.66	38.70	100.00	0.00			22.45	46.50	-24.05
333.10	43.30	100.00	270.00			27.29	46.50	-19.21
344.11	36.10	100.00	315.00			20.17	46.50	-26.33
368.65	36.30	100.00	315.00			20.74	46.50	-25.76
414.46	46.20	100.00	45.00			31.78	46.50	-14.72

Table 8. RIM Radiated Emissions – Class A Limit